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मानक

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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

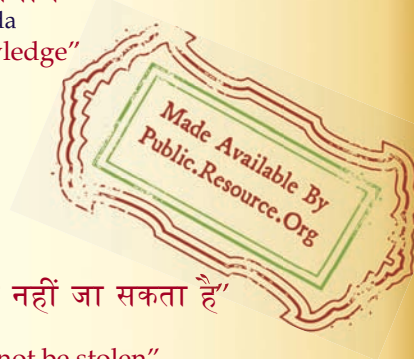
IS 7538 (1996): Three-phase squirrel cage induction motors for centrifugal pumps for agricultural applications [ETD 15: Rotating Machinery]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS 7538 : 1996

भारतीय मानक
कृषि अनुप्रयोग के अपकेन्द्री पम्पों के लिए तीन फेजीय
स्क्वियरल केज प्रेरण मोटरें — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard
THREE-PHASE SQUIRREL CAGE INDUCTION MOTORS
FOR CENTRIFUGAL PUMPS FOR AGRICULTURAL
APPLICATION — SPECIFICATION
(*First Revision*)

First Reprint APRIL 2000

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

October 1996

Price Group 6

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Rotating Machinery Sectional Committee had been approved by the Electrotechnical Division Council.

This revision of the standard has been taken up to incorporate various amendments issued earlier and also update the reference standards. An important change has been made in the standard to specify the performance of motor in terms of its efficiency in place of product of efficiency and power factor.

The three-phase induction motors for normal supply voltage variations are covered in IS 325 : 1996. It is observed that supply voltage available in many places in the country, particularly in the rural areas (where large number of centrifugal pumps are installed) has variations wider than those specified in IS 325 : 1996. This standard has been prepared with a view to cover the requirements of three-phase induction motors suitable for wider voltage variation than that specified in IS 325 : 1996.

To ensure satisfactory installation and maintenance of induction motors, the recommendations contained in IS 900 : 1992 shall be followed.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated expressing the result of a test shall be rounded off in accordance with IS 2 : 1960 Rules for rounding off numerical values (revised). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 JUNE 2001
TO
IS 7538 : 1996 THREE-PHASE SQUIRREL CAGE
INDUCTION MOTORS FOR CENTRIFUGAL PUMPS FOR
AGRICULTURAL APPLICATION — SPECIFICATION
(First Revision)

(Page 2, clause 12.3) -- Delete last sentence.

(Page 6, clause 18) — Delete last sentence.

(Page 7, clause 24.4, last sentence) — Substitute the following for the existing:

'The efficiency determined for full load shall be as specified in Tables 1 to 6 or higher'.

(Page 7, clause 24.5, last sentence) — Substitute the following for the existing:

'The efficiency of the motor determined at this load shall be as specified in Table 1 to 6 or higher.'

(ET 15)

**AMENDMENT NO. 2 MAY 2002
TO
IS 7538 : 1996 THREE-PHASE SQUIRREL CAGE
INDUCTION MOTORS FOR CENTRIFUGAL PUMPS FOR
AGRICULTURAL APPLICATION
— SPECIFICATION**

(First Revision)

(Page 6, clause 19.1.1) — Substitute 'shaft' for 'staff'

[Page 7, clause 22.3.1(s)] — Insert superscript ^{'1)} in the following manner:

• ¹⁾ s) Overspeed test (27). '

[Page 7, clause 22.3.2 (b)] — Substitute the following for the existing:

- b) Locked rotor readings of voltage, current and power input at a suitable reduced voltage (24.3). '

(ET 15)

**AMENDMENT NO. 2 MAY 2002
TO
IS 7538 : 1996 THREE-PHASE SQUIRREL CAGE
INDUCTION MOTORS FOR CENTRIFUGAL PUMPS FOR
AGRICULTURAL APPLICATION
— SPECIFICATION**

(First Revision)

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• ¹⁾ s) Overspeed test (27). '

[Page 7, clause 22.3.2 (b)] — Substitute the following for the existing

- b) Locked rotor readings of voltage, current and power input at a suitable reduced voltage (24.3), '

(ET 15)

Indian Standard

THREE-PHASE SQUIRREL CAGE INDUCTION MOTORS FOR CENTRIFUGAL PUMPS FOR AGRICULTURAL APPLICATION — SPECIFICATION

(First Revision)

1 SCOPE

This standard covers three-phase squirrel cage induction motors for centrifugal pumps for agricultural application and where the power supply variation is between +6 and -15 percent of the rated voltage provided the performance characteristic as specified here are suitable for the given application. This standard covers motors for voltages up to and including 650V and having output up to and including 15 kW.

2 REFERENCES

The standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 1885 (Part 35) : 1993/IEC 50 (411) : 1993 shall apply.

4 SITE CONDITIONS

4.1 The requirements related to altitude, temperature, form and symmetry of current and voltage shall be in accordance with 4 of IS 325 : 1996.

4.2 Voltage and Frequency Variation

Motors shall be capable of delivering rated output with

- a) the terminal voltage differing from this rated value by not more than +6 percent and -15 percent, or
- b) the frequency differing from its rated value by not more than +3 percent and -3 percent, or
- c) any combination of (a) and (b)

4.3 In the case of continuous operation at extreme voltage limits, the temperature-rise limits specified in Table 1 of IS 12802 : 1989 shall not exceed by 10°C. Motors, when operated under the extreme conditions of voltage and frequency variation, may

not necessarily have their performance in accordance with this standard.

4.4 It shall be assumed that the location and moisture or fumes shall not seriously interfere with the operation of the motor.

5 ENCLOSURES

The degree of protection to be provided by enclosures to the motor against foreign solid bodies and liquids shall be IP 21 or IP 22 or IP 23 (screen protected) or IP 44 or superior (totally enclosed) in accordance with IS 4691 : 1985.

6 COOLING

The method of cooling in the motor and their designation shall be IC 01 or IC 41 in accordance with IS 6362 : 1995/IEC Pub 34-6-1991.

7 MATERIALS

All the materials and components used in the manufacture of motors shall conform to relevant Indian Standards wherever these exist. Whenever it is not practicable to comply with this requirement, it shall be subject to agreement between the manufacturer and the purchaser.

8 RATED CONDITIONS OF VOLTAGE, FREQUENCY AND OUTPUT OF MOTOR**8.1 Rated Voltage**

The preferred rated voltage shall be 415 V.

8.1.1 Motor designed for operation at voltages other than 415 V shall be considered as complying with this standard provided they comply in all respects except as given in 12.1. The voltage for which the motor is designed shall be indicated on the name plate.

8.2 Rated Frequency

8.2.1 The preferred rated frequency shall be the standard frequency of 50 Hz.

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8.3 Rated Outputs

8.3.1 The preferred output ratings of the motor shall be 0.37, 0.55, 0.75, 1.1, 1.5, 2.2, 3.7, 5.5, 7.5, 9.3, 11 and 15 kW

9 DIMENSIONS

9.1 For Coupled Motors

9.1.1 The motor shall be constructed in standard frame numbers in accordance with IS 1231 : 1974, IS 2223 : 1983 and IS 2254 : 1985. The relationship of frame number and its output in kW specified in IS 1231 : 1974 or IS 2223 : 1985 may not necessarily be complied

10 TYPE OF DUTY AND CLASSES OF RATING

This standard is applicable to motors of continuous duty N_r specified in IS 12824 : 1989

11 PROVISION FOR EARTHING

Earthing of the motor shall be done in accordance with the relevant provisions of IS 3043 : 1987

12 PERFORMANCE VALUES

12.1 Minimum full load speed, maximum full load current, minimum starting torque, nominal efficiency of induction motors at rated voltage of 415 V and frequency 50 Hz shall be in accordance with Table 1 to Table 6

The motor shall perform satisfactorily in the under-loaded conditions of the pumping operation. The motors when tested at 75 percent of rated load and at rated voltage shall comply with values of efficiency as given in Table 1 to Table 6

NOTE — The value of full load current shall be taken as the average value of the currents measured in the three phases

12.2 For motors having rated voltage other than 415 V, values given in Table 1 to Table 6 shall be applicable except for value of maximum full load current which shall be changed in inverse proportion of the voltage

12.3 In case the manufacturer declares superior values of performance characteristics than those specified in 12.1, the declared values in this standard shall be subject to verification. For performance characteristics other than efficiency, the values obtained from test results shall conform to the declared values of the manufacturer within tolerances specified in Table 1 of IS 325 : 1996. However, the lowest

values obtained after applying tolerances, for any performance characteristic, shall not be lower than those specified in Tables 1 to 6. In case of superior values of efficiency, the tolerances indicated in Table 1 of IS 325 : 1996 is not applicable and the motors on verification should meet the values declared by the manufacturer

12.4 The values of minimum starting torque specified in Tables 1 to 6 for the motors are at room temperature. The values for slip, current and efficiency apply to motor when it has attained thermal equilibrium while delivering the rated output

13 OVERLOAD

13.1 Momentary Excess Torque

The motors shall be capable of withstanding for 10 s without stalling or abrupt change in speed (under gradual increase of load) an excess torque of 60 percent of the rated torque, the voltage and frequency being maintained at the rated value

13.2 Sustained Overloads

The motors are not capable of carrying sustained overloads

14 LIMITS OF TEMPERATURES AND TEMPERATURE-RISE

The limits of permissible temperatures and temperature-rise above the cooling medium temperature for motors having insulation of classes A, E, B, and F (see IS 1271 : 1985) shall be in accordance with Table 1 of IS 12802 : 1989

15 LIMITS OF VIBRATION SEVERITY

Unless otherwise specified by the user, the severity of vibration for the motors shall be within the class of normal limits specified in IS 12075 : 1987

16 LIMITS OF NOISE LEVELS

Unless otherwise specified by the purchaser, the limits of noise levels shall be in accordance with IS 12065 : 1987

17 EFFICIENCY AND POWER FACTOR

17.1 Efficiency

The efficiency of the motor at its rated output shall be marked on the rating plate

17.2 Power Factor

When required by the purchaser, power factor at rated output shall be declared by the manufacturer

Table 1 Values of Performance Characteristics of 2-Pole Three-Phase Induction Motors Having Enclosures for Degree of Protection IP 44 or Superior (see IS 4691:1985) and Method of Cooling IC 41 (see IS 6362:1995)

(Clause 12.1)

Rated Output kW	Full Load Speed, Min rev/min	Full Load Current, Max A	Breakaway Torque in Terms of Percent of Full Load Torque, Min	Efficiency Nominal	
				100 Percent	75 Percent
(1)	(2)	(3)	(4)	(5)	(6)
0.37	2 720	1.3	170	63	59
0.55	2 760	1.7	170	67	64
0.75	2 780	2.1	170	71	68
1.1	2 790	2.9	170	73	70
1.5	2 800	3.9	170	76	73
2.2	2 810	5.2	170	78	75
3.7	2 820	8.3	160	81	78
5.5	2 830	11.4	160	82	80
7.5	2 840	15.6	160	83	81
9.3	2 850	19.5	160	83.5	81.5
11	2 860	22.4	160	84	82
15	2 870	30.2	160	85	83

Table 2 Values of Performance Characteristics of 2-Pole Three-Phase Induction Motors Having Enclosures for Degree of Protection IP 21, IP 22 and IP 23 (see IS 4691:1985) and Method of Cooling IC 01 (see IS 6362:1995)

(Clause 12.1)

Rated Output kW	Full Load Speed, Min rev/min	Full Load Current, Max A	Breakaway Torque in Terms of Percent of Full Load Torque, Min	Efficiency Nominal	
				100 Percent	75 Percent
(1)	(2)	(3)	(4)	(5)	(6)
0.37	2 720	1.3	170	63	59
0.55	2 760	1.7	170	67	64
0.75	2 780	2.1	170	71	68
1.1	2 790	2.9	170	73	70
1.5	2 800	3.9	170	76	73
2.2	2 810	5.2	170	78	75
3.7	2 820	8.3	160	81	78
5.5	2 830	11.4	160	82	80
7.5	2 840	15.6	160	83	81
9.3	2 840	20.3	160	82	80
11	2 860	24.4	160	83	81
15	2 860	32.2	160	84	82

Table 3 Values of Performance Characteristics of 4-Pole Three-Phase Induction Motors Having Enclosures for Degree of Protection IP 44 Superior (see IS 4691:1985) and Method of Cooling IC 41 (see IS 6362:1995)

(Clause 12.1)

Rated Output kW	Full Load Speed, <i>Min</i> rev/min	Full Load Current, <i>Max</i> A	Breakaway Torque in Terms of Percent of Full Load Torque, <i>Min</i>	Efficiency Nominal	
				100 Percent	75 Percent
(1)	(2)	(3)	(4)	(5)	(6)
0.37	1 330	1.5	170	64	61
0.55	1 340	1.8	170	69	66
0.75	1 360	2.3	170	71	68
1.1	1 370	3.0	170	73	70
1.5	1 380	4.0	170	76	73
2.2	1 390	5.3	170	79	76
3.7	1 410	8.4	160	83	80
5.5	1 420	11.9	160	84	82
7.5	1 430	16	160	85	83
9.3	1 430	19.2	160	85.5	83.5
11	1 440	22.9	160	85.5	83.5
15	1 440	31.2	160	86	84

Table 4 Values of Performance Characteristics of 4-Pole Three-Phase Induction Motors Having Enclosures for Degree of Protection IP 21, IP 22 and IP 23 (see IS 4691:1985) and Method of Cooling IC 01 (IS 6362:1995)

(Clause 12.1)

Rated Output kW	Full Load Speed, <i>Min</i> rev/min	Full Load Current, <i>Max</i> A	Breakaway Torque in Terms of Percent of Full Load Torque, <i>Min</i>	Efficiency Nominal	
				100 Percent	75 Percent
(1)	(2)	(3)	(4)	(5)	(6)
0.37	1 330	1.5	170	64	61
0.55	1 340	1.8	170	69	66
0.75	1 360	2.3	170	71	68
1.1	1 370	3.0	170	73	70
1.5	1 380	4.0	170	76	73
2.2	1 390	5.3	170	79	76
3.7	1 410	8.4	160	83	80
5.5	1 420	11.9	160	84	82
7.5	1 430	16	160	85	83
9.3	1 430	20.3	160	84	82
11	1 430	23.9	160	84.5	82.5
15	1 430	33.3	160	85	83

Table 5 Values of Performance Characteristics of 6-Pole Three-Phase Induction Motors Having Enclosures for Degree of Protection IP 44 or Superior (see IS 4691:1985) and Method of Cooling IC 41 (see IS 6362:1995)

(Clause 12.1)

Rated Output kW	Full Load Speed, <i>Min</i> rev/min	Full Load Current, <i>Max</i> A	Breakaway Torque in Terms of Percent of Full Load Torque, <i>Min</i>	Efficiency Nominal	
				100 Percent	75 Percent
(1)	(2)	(3)	(4)	(5)	(6)
0.37	870	1.5	160	63	60
0.55	870	2.0	160	65	62
0.75	890	2.4	160	68	65
1.1	900	3.3	160	71	68
1.5	900	4.2	160	74	71
2.2	910	5.7	150	77	74
3.7	920	9.2	150	79	76
5.5	920	13.2	150	81	78
7.5	930	17.4	150	82	80
9.3	930	21.3	140	82	80
11	935	23.9	140	84	82
15	940	31.7	140	85	83

Table 6 Values of Performance Characteristics of 6-Pole Three-Phase Induction Motors Having Enclosures for Degree of Protection IP 21, IP 22 and IP 23 (see IS 4691:1985) and Method of Cooling IC 01 (see IS 6362:1995)

(Clause 12.1)

Rated Output kW	Full Load Speed, <i>Min</i> rev/min	Full Load Current, <i>Max</i> A	Breakaway Torque in Terms of Percent of Full Load Torque, <i>Min</i>	Efficiency Nominal	
				100 Percent	75 Percent
(1)	(2)	(3)	(4)	(5)	(6)
0.37	870	1.5	160	63	60
0.55	870	2.0	160	65	62
0.75	890	2.4	160	68	65
1.1	900	3.3	160	71	68
1.5	900	4.2	160	74	71
2.2	910	5.7	150	77	74
3.7	920	9.2	150	79	76
5.5	920	13.2	150	81	78
7.5	920	18.2	150	80	78
9.3	925	22.9	140	80.5	78.5
11	925	25	140	83	81
15	930	33.8	140	84	82

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17.2.1 In order to reduce the power losses in the distribution system shunt capacitors may be used to improve power factor. The guidance of selection of shunt capacitor for motors is given in IS 900 : 1992.

18 TOLERANCES

The tolerances applicable to the performance characteristics of the motor shall be in accordance with Table 1 of IS 325 : 1996. In case of declaration of superior values of performance characteristic tolerances are as specified in 12.3.

19 TERMINAL BOX AND TERMINAL MARKINGS

19.1 The position of terminal box on the motor shall be in accordance with 5 of IS 1231 : 1974. The size of the terminal box and terminals shall be sufficient to accommodate cables with aluminium conductors.

19.1.1 Terminal marking and direction of rotation of shaft shall be in accordance with IS 4728 : 1975.

20 MARKING

20.1 The following marking shall be provided on the rating plate fixed on each motor:

- a) Reference to this standard, that is, 'Ref ISS 7538 : 1996'.
- b) Induction motor.
- c) Name of manufacturer.
- d) Manufacturer's number and frame reference.
- e) Rated voltage and winding connections.
- f) Rated output in kW.
- g) Current, in amperes at rated output.
- h) Frequency in Hz.
- j) Type of duty.
- k) Class of insulation.
- m) Number of phases.
- n) Speeds in revolutions per minute, at rated output, and
- p) Efficiency at rated output.

20.2 BIS Certification Marking

The motors may also be marked with the Standard Mark.

20.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

21 INFORMATION TO BE GIVEN AT THE STAGE OF ENQUIRY AND PLACING ORDER FOR SUPPLY

The general information to be furnished when enquiring for and ordering an electrical motor is given in Annex C.

22 TESTS

22.1 General

The tests specified in 22.3 shall normally be carried out at manufacturer's works. Test methods given in IS 4029 : 1967 shall be followed.

22.2 Test Certificates

22.2.1 The requirements specified in 22.2 of IS 325 : 1996 shall apply.

22.3 Classification of Tests

22.3.1 Type Tests

The following shall constitute the type tests:

- a) Dimensions (9).
- b) Measurement of stator resistance.
- c) No-load running of motor and reading of voltage, current, power input and speed (24.1).
- d) Reduced voltage running up test at no-load (24.2).
- e) Locked rotor test (24.3).
NOTE: This test may be made at a reduced voltage.
- f) Full-load test to determine efficiency, power factor and slip (24.4).
- g) Test for efficiency at reduced load (24.5).
- h) Temperature-rise test at rated voltage (23.1).
- j) Temperature-rise test at reduced voltage (23.2).
- k) Overload test (13.1).

- m) Insulation-resistance test (both before and after the high-voltage test) (26);
- n) High-voltage test (25).
- ¹p) Test for vibration severity (15).
- ¹q) Test for limits of noise level (16).
- ¹r) Degree of protection provided by enclosure (5), and
- s) Overspeed test (27)

22.3.1.1 It is recommended that reports of type test be made in the form given in Annex C

22.3.2 Routine Tests

The following shall constitute the routine tests

- a) No-load test (24.1).
- b) Locked rotor test (24.3).
- c) Reduced voltage running up test at no-load (24.2).
- d) Measurement of stator resistance.
- e) Insulation resistance test (before high voltage test only) (26), and
- f) High-voltage test (25)

23 TEMPERATURE-RISE TEST

23.1 Test at Rated Voltage

23.1.1 The determination of the temperature-rise of three-phase induction motors delivering rated output under the rated conditions of voltage, frequency and shall be in accordance with IS 12802 : 1989

23.1.2 The limits for temperature rise applicable to three-phase induction motors shall be in accordance with Table 1 of IS 12802 : 1989

23.2 Test at Reduced Voltage

23.2.1 This test shall be carried out at rated load of the motor but at a voltage equal to 85 percent of the rated voltage. The temperature rise of winding shall not exceed by more than 10°C above the limits given in 23.1.2 when the motor is continuously operating

NOTE: A centrifugal pump may be used to load the motor for this test

¹ These are optional tests subject to mutual agreement between the purchaser and the manufacturer

24 PERFORMANCE TESTS

24.1 No-Load Test

The motor shall be run at rated voltage and frequency given on the rating plate. The motor shall run to its rated speed and shall not show abnormal electrical or mechanical noise. The input power, current and speed shall be measured and used in the determination of no-load losses and efficiency at full load

24.2 Reduced Voltage Running Up Test

The test is made to check the ability of motor to run up to its rated speed at no-load. The motor shall be supplied with reduced voltage of rated value for each direction of rotation

24.3 Locked Rotor Test

The test shall be carried out in accordance with provisions of IS 4029 : 1967. The test may be carried out at reduced voltage. The readings of the input current, power and breakaway rotor torque shall be determined. The values of breakaway torque shall be not less than the value given in Tables 1 to 6

24.4 Full Load Test

The motor shall be supplied with rated voltage and load on the shaft shall be adjusted such that it delivers the rated output. The values of voltage, power input current and speed shall be measured. The efficiency and power factor determined for full load shall not be less than the values specified in Tables 1 to 6

24.5 Test at 75 Percent of Full Load

The motor shall be supplied with rated voltage and output shall be adjusted such that it delivers 75 percent of the rated load. The efficiency of the motor determined at this load shall not be less than the values specified in Tables 1 to 6

NOTE: A centrifugal pump may be used to load the motor for full load and 75 percent load tests

25 HIGH-VOLTAGE TEST

The requirements and values of voltage for high voltage test shall be in accordance with 5 of IS 4029 : 1967

26 INSULATION-RESISTANCE TEST

The insulation resistance after the high-voltage test is applied, shall be not less than one megohm

NOTE: When it is required to dry out windings at site to obtain the minimum value of insulation resistance, it is recommended that procedure for drying out as specified in 11.4 of IS 900 : 1992 should be followed

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27 OVERSPEED TEST

27.1 The motors shall be designed to withstand 1.2 times the maximum rated speed

27.2 An overspeed test is not normally considered necessary, but may be performed when this is specified

and has been agreed between the manufacturer and the purchaser at the time of the order. An overspeed test shall be considered as satisfactory if no permanent abnormal deformation is apparent subsequently and no other weakness is detected which may prevent the motor from operating normally. The duration of any overspeed test shall be two minutes.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

IS No	Title	IS No	Title
325 1996	Three-phase induction motors (<i>fifth revision</i>)	4691 1985	Degrees of protection provided by enclosures for rotating electrical machinery (<i>first revision</i>)
900 1992	Code of practice for installation and maintenance of induction motor	4728 1975	Terminal marking and direction of rotation for rotating electrical machinery (<i>first revision</i>)
1231 1974	Dimensions of three-phase foot-mounted induction motor (<i>third revision</i>)	6362 1995/ IEC Pub 34-6 1991	Designation of methods of cooling of rotating electrical machines
1271 1985	Thermal evaluation and classification of electrical insulation (<i>first revision</i>)	12065 1987	Permissible limits of noise levels of rotating electrical machines
1885 (Part 35) 1993	Electrotechnical vocabulary Part 35 Rotating machinery	12075 1987	Mechanical vibration of rotating electrical machines with shaft heights 56 mm and higher measurement evaluation and limits of vibration severity (<i>superseding</i> IS 4729)
2223 1983	Dimensions of flange mounted ac induction motors (<i>second revision</i>)	12360 1988	Voltage bands for electrical installations including preferred voltages and frequency (<i>superseding</i> IS 585)
2254 1985	Dimensions of vertical shaft motors for pumps (<i>second revision</i>)	12802 1989	Temperature-rise measurement of rotating electrical machines
3043 1987	Code of practice for earthing (<i>first revision</i>)	12824 1989	Type of duty and classes of rating assigned to rotating electrical machines
4029 1967	Guide for testing three-phase induction motors		

ANNEX B**(Clause 21)****INFORMATION TO BE GIVEN WITH ENQUIRY AND ORDER**

When enquiring for and ordering an electrical motor to comply with this standard the following particulars shall be supplied:

- | | |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1) Site and operating conditions; | 11) The maximum temperature of the cooling air in the place in which the motor is intended to work in ordinary service. |
| 2) Reference to this standard, 'Ref ISS 7538 1996'. | 12) Maximum permissible temperature-rise of motor required, if different from this standard. |
| 3) The degree of protection provided by enclosure. | 13) The altitude of the place in which the motor is intended to work in ordinary service if it exceeds 1 000 m. |
| 4) Type of construction and mountings. | 14) If a motor is required to operate between various limits of voltage, current, frequency or speed, the corresponding value of the voltage, current, frequency and speed respectively. |
| 5) Frequency in Hz. | 15) System of earthing, if any, to be adopted. |
| 6) Number of phases. | 16) Details of shaft extension required. |
| 7) Mechanical output in kW. | 17) Method of starting to be employed, and |
| 8) Rated Voltage. | 18) Shunt capacitors for power factor correction if required |
| 9) Class of insulation. | |
| 10) Speed in revolutions per minute, approximate, at the rated output. | |

ANNEX C
(Clauses 21 and 22 3 1 1)
FORM FOR TYPE-TEST REPORT OF THREE-PHASE INDUCTION MOTOR
(As per IS 7538 1996)

Name and Address of the Manufacturer _____

Purchaser _____ Certificate No _____

Purchaser's Order No _____ Order Acceptance No _____

RATING PLATE DATA

Output kW	Full Load Speed RPM	Phase Connection	Frequency Hz	Voltage V	Full Load Current A	Enclosure	Duty	Rating	Frame	Class of Insulation	Efficiency at Rated Output Percent
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TEST CHARACTERISTICS

Loading Condition	Voltage V	Current A	Power Input kW	Slip Percent	Load Percent	Power Factor		Efficiency in Percent	
						Guaranteed	Test	Guaranteed	Test
No Load									
Load									
					25				
					50				
					75				
					100				

TEMPERATURE RISE TEST AT RATED VOLTAGE

Hours Run (h)	Volts (V)	Current (A)	Power Input (kW)	Power Output (kW)	Ambient Cooling Air (°C)	Temperature Rise C of Stator Winding by Resistance or Thermometer (T)
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TEMPERATURE RISE TEST AT REDUCED VOLTAGE

Hours Run (h)	Volts (V)	Current (A)	Power Input (kW)	Power Output (kW)	Ambient Cooling Air (°C)	Temperature Rise C of Stator Winding by Resistance or Thermometer (T)
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BREAKAWAY TORQUE AND STARTING CURRENT

Locked Rotor

Voltage Applied V	Breakaway Current A	Starting Torque kg/m	Power Input kW
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STATOR WINDING RESISTANCE PER PHASE

ohms at °C

Reduced Voltage running up test to stator The Motor runs up to full load speed at no-load on both direction of rotation with Volts () applied

Momentary excess torque kg m for 10 seconds withstood/failed

Test Conducted on Machine No

Tested by

on

Approved by

Date

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